PLANT PROTECTION BULLETIN

A Publication of the
WORLD REPORTING SERVICE ON PLANT DISEASES AND PESTS

VOL. VI, No. 7 APRIL 1958

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
ROME

FAO PLANT PROTECTION BULLETIN

is issued as a medium for the dissemination of information received by the World Reporting Service on Plant Diseases and Pests, established in accordance with the provisions of the International Plant Protection Convention, 1951. It publishes reports on the occurrence, outbreak and control of pests and diseases of plants and plant products of economic significance and related topics, with special reference to current information. No responsibility is assumed by FAO for opinions and viewpoints expressed in the Bulletin.

Manuscripts for publication, or correspondence regarding the World Reporting Service, should be addressed to Dr. Lee Ling, Plant Production Branch, Agriculture Division, FAO, Viale delle Terme di Caracalla, Rome, Italy; subscriptions and other business correspondence to the Distribution and Sales Section, FAO, Viale delle Terme di Caracalla, Rome, Italy.

The Bulletin is issued monthly in English, French, and Spanish, and twelve numbers, commencing with the October issue in each year, constitute a volume. Subscription rates are $ 3.00 or 15s. per annum; single numbers are priced at $ 0.30 or 1s. 6d. The citation is FAO Plant Protection Bulletin, or, in abbreviation, FAO Plant Prot. Bull.

FAO Plant Protection Bulletin

Vol. VI, No. 7 A Publication of the April 1958

World Reporting Service on Plant Diseases and Pests

The Control of Angular Leaf Spot of Bean in Colombia[1]

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In 1951 and 1952 the dry bean improvement program of the Colombian Ministry of Agriculture at the Tulio Ospina Experiment Station, Medellín, was concerned with attempts to increase the yields of local varieties and incorporate into them resistance to rust (*Uromyces phaseoli typica* Arth.) and to anthracnose (*Colletotrichum lindemuthianum* [Sacc. & Magn.] Scrib.). However, the increase in the prevalence and severity of angular leaf spot (*Isariopsis griseola* Sacc.) through 1953 and 1954 at that station suggested that rust and anthracnose, although still potentially serious diseases, were becoming secondary in importance. This necessitated a revision of the bean improvement program from the breeding standpoint, and a study of the angular leaf spot disease was begun to determine its effects upon yields and methods of control.

Fungicidal Control

During the course of preliminary control studies it was found that a variety fungicide interaction was always present. This appeared to result either from the differential control of one or more of the foliage diseases of beans by various fungicidal combinations, or from the adverse effects of some fungicides on certain varieties. For example, it was determined that ferbam and zineb were useful compounds for the control of angular leaf spot and anthracnose, and that wettable sulfur controlled rust. However, with the bean variety Algarrobo, which is rust- and anthracnose-resistant in Medellín, applications of sulfur alone consistently reduced the yields. Furthermore, although applications of ferbam increased the yields of Algarrobo through the control of angular leaf spot, when ferbam and sulfur were used simultaneously, the deleterious effect of the sulfur nullified the benefit from ferbam.

It was observed in the same tests that certain fungicidal combinations were sometimes more effective in the control of angular leaf spot, rust and anthracnose, than any of the component fungicides alone. Where more than one disease was present on a given variety, this greater combined effectiveness could be said to result from the differential control of the various diseases by the individual fungicide in the mixture. When the phenomenon was noted on a variety susceptible to only one disease, however, such an explanation was no longer possible and it appeared instead that there was a synergistic effect of the two or more fungicides.

After the preliminary studies were completed, five varieties of dry beans were selected on the basis of their disease reactions and placed in an experiment in which four fungicides were used in all possible combinations. The varieties and their disease reactions are shown in Table 1. The column "bacterial blight" (*Xanthomonas phaseoli* [E.F. Sm.] Dows.) was included to indicate the reactions to the only other disease of importance in the test.

[1] Paper No. 92 of the Agricultural Journal Series of The Rockefeller Foundation.

TABLE 1. *Disease reactions of the dry bean varieties used in fungicide tests at Tulio Ospina Experiment Station, Medellín.*

Variety	Disease reaction			
	angular leaf spot	rust	anthracnose	bacterial blight
Chiquito Colorado	MR[a]	MR	R	MR
Algarrobo	S	R	R	MR
Uribe Redondo	S	R	MR	MR
Liborino	R	S	R	S
Estrada Rosado	S	S	S	MS

[a] R = resistant; MR = moderately resistant; MS = moderately susceptible; S = susceptible.

The experiment was made in four consecutive semesters [2] in 1954 and 1955, and the results were later analyzed as one experiment. The yield data and best fungicide treatments are shown in Table 2. Since the fungicides did not control the blight, the yield reductions in Liborino can be partially attributed to this disease.

During the course of the field trials it was considered that the fungicide applications were adequate and effective because the disease control was excellent. The plots were sprayed at weekly intervals throughout the growing season and 90 to 95 percent control was estimated. A comparison of Tables 1 and 2 is of value with reference to disease control, varietal response to fungicides, potential varietal yields and effects of diseases individually and in combination. On the variety Chiquito Colorado, which has a relatively high degree of disease resistance, the check plots yielded only 78 percent of the best treatment. This result has several possible explanations: (1) thiram was con-

[2] In Colombia there are two growing seasons per year at elevations below approximately 2,400 meters. These growing seasons are called the "A" semester and "B" semester, respectively.

TABLE 2. *Yields and best fungicidal treatment determined after spraying five bean varieties for four semesters, Medellín.*

Variety	Best treatment	Yields in kilograms per hectare		Yield of check in percent of best treatment
		treatment	check	
Chiquito Colorado	thiram	1 894	1 484	78
Algarrobo	zineb + copper [a] + thiram	1 444	917	64
Uribe Redondo	copper [a] + copper [b] + thiram	1 311	1 120	85
Liborino	zineb	1 196	857	71
Estrada Rosado	zineb + thiram + copper [a]	1 214	705	58

[a] Tetra copper calcium oxychloride (45 percent metallic Cu).
[b] Copper oxychloride (5 percent metallic Cu).

tributing more to yield than to disease control; (2) the effects of angular leaf spot, rust and bacterial blight, may be greater than is implied by "moderately resistant" readings in the field; or (3) a combination of both.

The reactions in Algarrobo and Uribe Redondo to all the diseases concerned in these tests were similar. There were no other factors operating that would appear to favor Uribe Redondo over Algarrobo and, in fact, of the two, Uribe Redondo is slightly more susceptible to anthracnose. The yield data indicate, therefore, that the two bean varieties, which are equally susceptible to angular leaf spot, are either not equally affected by the disease, or else respond distinctly to fungicides. Why Algarrobo should be more susceptible, in terms of yield, is unknown since both varieties are usually completely defoliated at about the same time when the disease is severe. The only plausible explanation is that Uribe Redondo normally matures a few days later than Algarrobo, and in the former, enough photosynthesis may occur in the pods of the defoliated plants to allow the seed to continue maturation on a reduced scale.

The effects of a combination of rust and bacterial blight can be seen in the yields of Liborino. It is worth while to compare Algarrobo, Liborino and Estrada Rosado. Algarrobo is susceptible to angular leaf spot and Liborino to rust and bacterial blight. Nevertheless, the untreated Liborino yielded 71 percent of the best treatments, while Algarrobo yielded but 64 percent. These figures show clearly the severity of angular leaf spot. A comparison of Algarrobo and Estrada Rosado indicates that a complex of diseases, such as occurred on the latter, did not do the damage that one might suspect. Algarrobo, attacked by only one pathogen, yielded but 6 percent more of its potential than did Estrada Rosado, which was attacked by one bacterial and three fungous pathogens.

The variety Algarrobo was released to the farmers in the Cauca Valley in 1954. It was a high-yielding bean and, as a result, the land planted to beans in the valley, which is the largest single dry bean-producing area in Colombia, was greatly increased through 1954 and 1955. Furthermore, a number of farmers prepared their land for sprinkler or furrow irrigation, so that two crops of beans could be produced during the two annual dry periods, in addition to the two crops grown during the two rainy seasons of the year. Thus, beans, a short season crop, were produced four times a year. Angular leaf spot was seen in a dry season planting of Algarrobo in the middle of 1955, and during the rainy season planting that followed, the disease spread over a large part of the Cauca Valley. The epiphytotic of angular leaf spot in the latter part of 1955 did a tremendous amount of damage and many bean crops were virtual failures. The years 1956 and 1957 were very dry, even during the normal rainy seasons, and very little angular leaf spot was seen.

Some control and effect-on-yield studies were begun during the rainy season at the Palmira Experiment Station in the Cauca Valley, after it was observed in the summer of 1955 that angular leaf spot might develop in epiphytotic proportions in subsequent plantings. An experiment was designed with the varieties Algarrobo, Estrada Rosado, Panameño and Sangretoro. The latter two were the old commercial varieties in the Cauca Valley and were slightly less susceptible to angular leaf spot than Algarrobo and Estrada Rosado. Estrada Rosado was included for comparison with the data from Medellín, because rust and anthracnose were minor diseases in the Cauca Valley and seldom warranted disease notes in the experimental plots. Although bacterial blight was of slightly greater importance, angular leaf spot was the disease of principal concern in this test. Three fungicides were used, of which zineb was one. This material was so superior to the other two on all varieties, that the data in Table 3 compare only the zineb plots with the checks.

The results in Table 3 are from 1955 B; in all previous and subsequent semesters the prevalence of angular leaf spot was so low that no valid conclusions as to disease control could be drawn from fungicide tests. It can be seen that angular leaf spot did not affect the yield of Algarrobo as much as it did that of the other varieties, even though Algarrobo has a higher susceptibility rating than Panameño and Sangretoro. As these data represent only one semester's study, they are by no means conclusive; they are quite indicative, however, since *Isariopsis* was highly preva-

TABLE 3. *Yields obtained from four dry bean varieties treated with zineb, Palmira Experiment Station, 1955 B.*

Variety	Yields in kilograms per hectare		Yield of check in percent of treated
	zineb	check	
Algarrobo	1 542	1 225	79
Panameño	1 382	938	68
Estrada Rosado	1 294	869	67
Sangretoro	1 286	868	68

lent in the nontreated plots. Algarrobo is apparently the safest variety for the farmers to plant, in view of the fact that it outyielded Panameño and Sangretoro in trials made before the appearance of angular leaf spot in the Cauca Valley and that in the test it was less affected by the pathogen than the other two varieties. In epiphytotic years a farmer who seeds Panameño, for example, and exercises disease control measures, may not expect to gain very much over the farmer who uses Algarrobo and lets the disease run its course. Obviously, time and severity of infection may influence this observation, and the replacement of one susceptible variety with another does not eliminate the need for disease control practices.

The severity of angular leaf spot is clearly shown in Table 3. Although the relationships are not comparable in their entirety, the 67 percent yield of Estrada Rosado when attacked by *Isariopsis* only in Palmira (Table 3), and the 58 percent yield of the same variety attacked by four pathogens in Medellín (Table 2), are noteworthy. Attention should also be called to the apparent greater susceptibility of Algarrobo in Medellín than in Palmira.

Of particular value in the disease control studies was the determination that the native Colombian beans have fairly good genetic potentials for yield. The limiting factor in their usefulness is disease susceptibility.

In the experiments on the effects of angular leaf spot on yields, nine or ten sprays were applied during the growing season. Subsequent work at Medellín showed that normally the fungus does not attack the plants severely until shortly before flowering time, and that any amount of disease that occurs after the plants begin to mature apparently causes only defoliation without consequent yield reduction. Therefore, both early and late spraying can be eliminated and the number of sprays reduced to five or six.

For all of the fungicides it was necessary to add a spreader-sticker compound, such as diethylene glycol abietate, to the suspension. In Colombia the addition of such compounds to sprays is indispensable because of the frequent rains during the early and middle parts of the growing season; fungicides used without a sticking agent are washed off the foliage with the first rain and offer no protection to the plants. For good coverage, it was necessary to apply approximately 250 gallons per hectare of the fungicide-sticker mixture to the adult plants.

Influence of Cultural Practices

As already mentioned, the epiphytotic of angular leaf spot in the Cauca Valley in 1955 B was devastating. In that year, many fields contained nothing but completely defoliated plants and a high percentage of shriveled pods. The importance of the disease becomes clearer when it is known that the region could easily produce enough beans for the entire Colombian population of 12 or 13 million.

Not all of the factors that influenced the build-up of such a large quantity of inoculum within the period of two growing seasons are

definitely known. Aside from those pertaining directly to the temperature and moisture requirements of the fungus, the greatest single contributing factor was in all probability extremely poor cultural practices. It was observed that the heaviest losses were suffered by farmers who had planted beans in or near fields where the same crop had been planted the preceding one or more semesters. According to published information [3] the angular leaf spot fungus was undoubtedly surviving the dry periods, when no beans were planted, on the remains from the previous crop. The farmers who planted during the dry summer weather and irrigated their beans were thus encouraging the build-up of large quantities of inoculum by shortening the survival period, and by creating a favorable environment as regards the moisture requirements of the fungus. Therefore, in addition to its usefulness in maintaining soil fertility, crop rotation is advisable as a safeguard. A rotation of at least two years is probably required, in view of the finding by Cardona and Walker [3] that *Isariopsis griseola* survived two winters on bean trash in the soil of Wisconsin. Coincident with rotation there must be good land preparation, so that trash remaining in the field is well plowed under after each crop. Moreover, beans should not be planted immediately adjacent to fields in which beans were recently harvested. The greatest distance that a farmer can maintain, consistent with his rotational plans and the location of bean fields on his neighbors' lands, is the most advisable.

No evidence has been obtained with regard to weed hosts of the pathogen in Medellín, where angular leaf spot is a serious disease every semester. A cursory examination of weed plants along fence rows and in uncultivated fields near Medellín and also in the Cauca Valley has failed to reveal the presence of any that might serve for the production of even small quantities of inoculum. However, the possibilities have not been exhausted.

With regard to the possible seed-borne nature of the organism, isolations from surface disinfected seeds have produced colonies of *Isariopsis griseola.* [4] The relative importance of this means of dissemination has not been determined, however, because the pathogen could not be isolated from many lines and varieties of beans that were highly susceptible to angular leaf spot in the field. Wind may be another means of dissemination. The conidia of *I. griseola* are borne free on the coremium, and it appears likely that they may be carried over relatively long distances.

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[3] CARDONA-ALVAREZ, C. and J. C. WALKER. 1956. Angular leaf spot of bean. *Phytopathology 46* : 610-15.

[4] OROZCO-SARRIA, H. and C. CARDONA-ALVAREZ. 1958. Seed transmission of angular leaf spot of bean. (in press)

Insect Pests in British Colonial Dependencies in 1957

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Experience has shown that control of cutworms, *Agrotis* spp. (Lep., Noctuidae), by spraying, is more effective than by the application of poison baits. The following sprays have been used with success; endrin (one part of an emulsion containing 19.5 percent endrin, in 450 parts water), or DDT (one part of an emulsion containing 25 percent DDT, in 240 parts water). The best results are obtained when the sprays are applied between 20:00 and 22:00 hours.

Nigeria

The coffee berry borer, *Stephanoderes hampei* (Ferr.) (Col., Scolytidae), caused considerable losses in Abeokuta Province of the Western Region and in Kabba Province, in the southernmost part of the Northern Region, in January.

After a low rainfall in 1956, considerable damage was done to cacao by the shot-hole borer, *Xyleborus morstatti* Hag. (Col., Scolytidae), in Abeokuta and Ondo Provinces of the Western Region and in Kabba Province in January-March. This is the most important of a number of Scolytids that attack seedling cacao in Nigeria (see *Rept. Dept. Agr. Nigeria 1953-54*, Pt. II, p. 44. 1956). According to Brown, [1] *X. morstatti* is widely distributed in the tropical areas of West Africa, and also occurs in East Africa, Madagascar, Mauritius and Seychelles, and in India, Indochina and Indonesia (Java, Sumatra). It is most frequently recorded from coffee but also from cacao and avocado.

A very severe infestation by the oil palm leaf miner, *Coelaenomenodera elaeidis* Maulik (Col., Hispidae), occurred over an area of 100 square miles. The insect appears to have spread from near the Dahomey border. The species has been recorded previously in Nigeria by Golding. [2] According to Lepesme,[3] the adults of this Hispid, which he records from Sierra Leone, Ghana and the Belgian Congo, feed on the underside of the leaves of the oil palm, coconut and other palms. The larvae mine in the leaves. Damage is stated to be sporadic but sometimes important.

In the field of control, a trial at Mokwa (Northern Region) in which cotton was sprayed 11 times at the rate of 2.4 lb. DDT and 0.6 lb. *gamma* BHC per acre yielded 1,483 lb. seed cotton per acre as compared with 455 lb. from unsprayed cotton. The major pest controlled was the cotton stainer, *Dysdercus superstitiosus* (F.) (Hemipt., Pyrrhocoridae).

An army worm, *Laphygma* sp. (Lep., Noctuidae), was prevalent in several areas in the Western and Northern Regions in April and May. Outbreaks in the Western Region were effectively controlled by applications of Didimac 25 and Gammalin 20.

Lepidopterous stem borers of sorghum. A correction is necessary to the second half-yearly report for 1956 (see *FAO Plant Prot. Bull. 5*: 108. 1957). The order of importance of the species attacking sorghum should read: *Sesamia* (dominant), *Busseola* (abundant), *Coniesta* (limited) and *Eldana*. While stem borers are a limiting factor in the production of maize in the south, there is no evidence that this is true of sorghum in the north.

Trinidad

A further and more serious outbreak of the giant grasshopper, *Tropidacris dux* (Dru.) (Orthopt., Acrididae), than that recorded in 1954 (see *FAO Plant Prot. Bull. 3*: 177. 1955) occurred on exactly the same lines in the extreme southwestern corner of Trinidad in 1957. Coconut, *Erythrina* sp., and banana were attacked in that order of severity. Excellent control was obtained by experimental low volume spraying with dieldrin on about 80 acres.

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[1] Brown, E. S. 1954. *Xyleborus morstatti* Hag. (Coleoptera, Scolytidae), a shot-hole borer attacking avocado pear in the Seychelles. *Bull. Ent. Res. 45* ; 707-10.

[2] Golding, F. D. 1946. The insect pests of Nigerian crops and stock. *Spec. Bull. Agr. Dept. Nigeria 4.*

[3] Lepesme, P. 1947. Les insectes des palmiers, pp. 552-53. Paris.

Outbreaks and New Records

Cuba

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Tobacco Blue Mold: A First Record

BLUE mold, caused by *Peronospora tabacina*, was found and identified for the first time in Cuba on cultivated tobacco in November 1957 by the Division of Plant Pathology of the Agricultural Experiment Station, Santiago de las Vegas. Although *P. tabacina* is regarded to be indigenous to North and South America, it was not previously known to occur in the West Indies.

The severity of the outbreak appears to indicate that the disease has existed in Cuba for some time and was introduced at least two years ago. The disease probably first attacked the seed bed but remained undetected until it was spread into the field. The unusual weather conditions that prevailed during the last few years have undoubtedly facilitated its spread.

It is not known how this disease was introduced into this country. Probably the conidia of the fungus were carried by wind from the infested coastal areas of the United States. The oospores could be introduced with seed or used shade cloth, or even with tobacco dust imported as insecticide. Private or commercial airplanes or tourists coming from infested areas might also carry the fungus incidentally.

To control blue mold and to prevent its spread, the following sanitary measures have been recommended to tobacco growers:

1. Selection of seed bed location; old bed sites should not be used again.
2. Complete or partial removal of the shade in the seed bed at occasions to reduce the air humidity.
3. Suspension or reduction of irrigation as far as possible.
4. Application of an appropriate fungicide, such as ferbam or zineb, in the seed bed twice each week. The treatment should begin as soon as the disease is reported in the area.
5. Transplanting only healthy seedlings.
6. Wherever necessary, plants in the field should also be treated with a fungicide, using ferbam or zineb until 20 days before harvest and an antibiotic such as Agrimycin shortly before harvest.
7. Early harvest of mature leaves.

In addition to these control measures, the revision of certain plant quarantine regulations is being studied. It is proposed that the importation of used shade cloth, which was previously permitted when accompanied by a fumigation certificate, and tobacco dust be prohibited or be made subject to adequate fumigation at the port of entry. The present regulations governing the importation of tobacco seed were established mainly to preserve the purity of the variety *havanensis*, and should be replaced by regulations aiming at efficient phytosanitary control.

India

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Smynthurodes betae: *A new Pest of Common Bean in Mysore*

PLANTS of common bean (*Phaseolus vulgaris*) were recently found to be infested around Bangalore by a root aphid, *Smynthurodes betae* Westw. (= *Trifidaphis phaseoli* Pass.). A large number of insects in both apterous and alate forms, as well as young ones in different stages of development, were present on the roots of the infested plants. When the infested plants were carefully taken out of the soil, the aphids were seen clustering around the main root

and on some root branches and root nodules (Figure 1). The aphids showed a tendency to avoid light as they slowly moved away from the exposed portions and hid under the roots and soil clods adhering to the roots. Where the aphids were clustering in large numbers, a thin grayish or whitish covering was present on the surface of the root. When root tips were infested, the affected roots showed symptoms of drying. The aerial parts of infested plants generally showed stunted growth and the leaves reduced in size. Two species of ants, *Camponotus* sp. and *Solenapsis* sp., were found in association with the aphids, and in most cases ant holes and loose earth were present near the bases of infested bean plants.

The apterous viviparous female is oval, highly convex above, pale pinkish and covered with a whitish pulverulence, with pale ochreous legs and no cornicles, and measures 1.8 to 2.3 millimeters in length. The alate viviparous female is darker, with smoky or dark bands across the pale yellowish pink abdomen, without cornicles, and measures 2.2 to 2.5 millimeters in length.

Although *Smynthurodes betae* is known to be distributed in many countries in Central and North Europe, Asia and North America, there appears to be no previous record of this subterranean species in India.

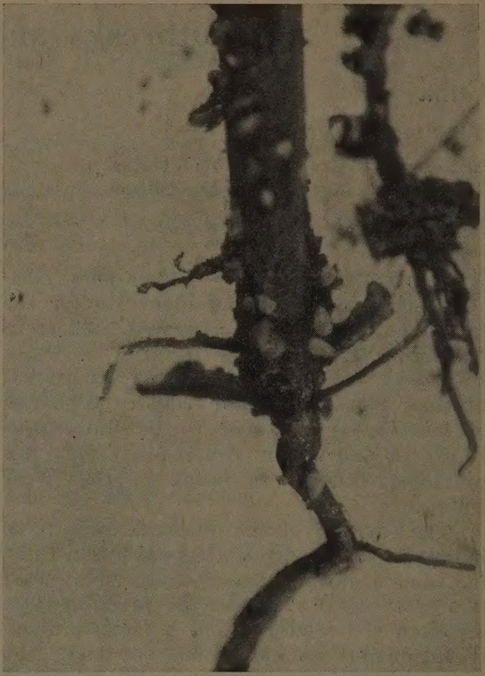

Figure 1. Roots of common bean infested by *Smynthurodes betae*.

Jordan

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Insect Pests of Sugar Beet

As observed at the Experiment Station at Wadi Fara, the major insect pests affecting sugar beets are the beet weevil, *Lixus ferrugatus* Ol., spinach leaf miner, *Pegomyia hyoscyami* Panz., and the widely distributed bean aphid, *Aphis* (*Doralis*) *fabae* Scop.

The adult beetles of *Lixus ferragatus* appear in March, feeding on leaves. Eggs are laid in the stems and hatch at the beginning of May. Larvae feed in the stems and penetrate down into the roots. There are two generations each year. Other species of *Lixus*, such as *L. junci* Boh. and *L. ascanii* L., are sometimes also found on beets.

Under the favorable conditions of the Jordan Valley, *Pegomyia hyoscyami* may have three or more generations. The adult flies appear in March-May. Maggots mine in leaves, causing blister-like spots.

Other insects which have been found to feed on beets, include the following:

Coleoptera
- *Marseulia dilativentris* Reiche
- *Phyllotreta cruiferae* Goeze
- *Psylliodes elliptica* All.

Lepidoptera
- *Pyrameis cardui* L.
- *Pieris brassicae* L.

Ocnogyna loewi Zell.
Laphygma exigua Hb.
Brotolomia meticulosa L.
Prodenia litura F.
Phthorimaea ocellatella Boyd
Ephestia elutella (Hb.)

Potato Tuber Worm

The potato tuber worm, *Gnorimoschema operculella* (Zell.), has been found in the potato fields of the Jordan Valley and in West Jordan. The larvae were observed to be present only in the tubers but were not found to mine in the leaves or burrow in the stems. In the laboratory the insect had produced ten generations one year.

Leafhopper on Wheat

A leafhopper, *Cercopis sanguninolenta intermedia* (Kirschbaum), occurred in great numbers on wheat during the spring of 1956 in the Tubas area, Nablus district, West Jordan. The outbreak inflicted considerable damage; the leaves and ears of affected wheat plants turned yellow prematurely. This red- and black-colored species of leafhopper usually lives on various wild plants.

Fig Stem Borer

The fig stem borer, *Batocera rufomaculata* (de Geer), was found in June 1957 in the Ramallah district, West Jordan. Pupae and imagoes were both present on many fig trees. It was noticed that this insect appears to prefer fig trees in vigorous growth of a diameter of 25 to 30 centimeters. Young trees and trees of poor growth were evidently not attacked.

Codling Moth on Walnut

The codling moth, *Carpocapsa pomonella* (L.) subsp. *putaninana* (Stgg.), occurred as a pest of Persian walnut (*Juglans regia*) in various districts of West and East Jordan. On a number of walnut trees nearly all the nuts were found to be infested.

Peru

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Occurrence of Wheat Stem Rust Race 29

A race of wheat stem rust (*Puccinia graminis tritici*), which was not previously known to occur in Peru, was found in 1956 and identified as race 29 at the Experimental Station of Molina on the standard set of differential hosts. The rust sample was collected on 22 June 1956 on wheat plants grown in the Province of Huamachuco, Department of La Libertad, at an altitude of 3,100 meters, where as high as 30 percent infection was observed on wheat varieties Florence Aurora and Egypt N.A. 101.

Reactions to race 29 of five wheat varieties as determined in three other countries in America are presented in Table 1 in comparison with the reactions observed in Peru. Kenya B 286 is resistant to race 29 in all four countries. Kenya 117 A is susceptible only in the United States, and Lerma Rojo only in Peru. Bowie and Kenya 58 are both susceptible in all four countries. The variation shown in the varietal reactions to race 29 in different countries indicates strongly the need for testing varietal resistance in each country or region where the race occurs.

As wheat varieties cultivated in northern Peru proved to be susceptible to race 29, it is expected that this rust race would increase its range in the future.

In northern Peru virulent races of wheat stem rust have been repeatedly found. Before the discovery of race 29 in La Libertad, race 189 occurred in 1939 and 1940 in Lumbayeque and biotype 15 B-2 P, which is similar to race 189, in 1952 in Cajamarca. In the mountains of this region, barberries are widely distributed and may be an important factor in the appearance of new physiologic races. The distribution and prevalence of

TABLE 1. *Reactions to wheat stem rust race 29 of five wheat varieties in four American countries.*

Variety	Rust reactions [a]			
	U.S.A. (St. Paul)	Mexico	Canada	Peru
Bowie	S	S	S	S
Lerma Rojo	R	R	R	S
Kenya 58	S	S	S	S
Kenya 117 A	S	R	R	R
Kenya B 286	R	R	R	R

[a] S = susceptible; R = resistant.

physiologic races should therefore be regularly and systematically investigated in this northern region, in both the highlands and coastal area, in order to follow the change of prevailing rust races for guidance in wheat breeding. Efforts should also probably be made to eradicate the susceptible species of barberries.

Plant Quarantine Announcements

Australia

Three quarantine proclamations published in the *Commonwealth of Australia Gazette*, No. 73, 30 December 1957, refer to the importation of plants into Australia.

Quarantine Proclamation 45P of 21 November 1957 declares *Mimosa invisa* to be a pest affecting plants and prohibits the importation of plants and parts of plants of this weed.

Quarantine Proclamation 46P of 24 December 1957 declares the European house borer (*Hylotrupes bajalus*) to be a pest affecting plants, its introduction being prohibited. The importation of any article infested with, or likely to introduce, this pest is also prohibited except in accordance with the Quarantine (Plants) Regulations of 11 September 1935, as amended.

Quarantine Proclamation 47P of 24 December 1957 provides that the importation of plants or parts of plants, other than seed, of alfalfa or lucerne (referring to *Medicago sativa, M. media, M. falcata* and *M. glutinosa* and derivatives of any of those species or any closely related species) is absolutely prohibited, and that the importation of seeds of alfalfa or lucerne is prohibited except in pursuance of a permit issued by the Director of Quarantine and in accordance with the conditions and restrictions specified in the Quarantine (Plants) Regulations. By this new proclamation, Quarantine Proclamation No. 43P of 22 March 1956 (*FAO Plant Prot. Bull. 4*: 159. 1956) is revoked.

Japan

Plant Quarantine Law Enforcement Regulations 1950 (see *Digest of Plant Quarantine Regulations* 1952) was amended by Amendment Agriculture and Forestry Ordinances No. 7 of 1951, Nos. 20 and 36 of 1952, Nos. 4 and 74 of 1953, Nos. 67 and 73 of 1954, No. 55 of 1955, No. 45 of 1956, and Nos. 9, 19 and 42 of 1957. The modifications introduced in the provisions governing the importation of plants mainly concern the ports of entry and the districts from which the importation of specific plants is prohibited.

Designated Ports of Entry

Plants or prohibited articles shall not be imported, except by mail, at any place other than the designated ports of entry or airfield.

Ports: Otaru, Hakodate, Tokyo, Yokohama, Yokosuka, Shimizu, Nagoya, Yokkaichi, Tsuruga, Maizuru, Osaka, Kobe, Hiroshima, Shimonoseki, Moji, Fukuoka, Sasebo, Nagasaki and Kagoshima.

Airfield: Haneda

In addition, the following ports are designated for the entry of shipments of specified plant products.

For Gramineae seeds: Kushiro, Muroran, Shiogama, Niigata, Fushikitoyama, Toyohashi, Gamagori, Taketoyo, Uno, Komatsujima, Niihama, Imabari, Kochi, Hosozima, Miike and Misumi.

For soybean: Aomori, Miyako, Niigata, Uno and Mizushima.

For timber: Rumoe, Muroran, Miyako, Shiogama, Akita, Sakata, Niigata, Fushikitoyama, Nanao, Taketoyo, Wakayamashimotsu, Onomichiitozaki, Sakai, Komatsuzima and Saeki.

Prohibited Plants and Districts

The following plants are designed as "prohibited articles" whose importation is not permitted unless an import permit has been obtained from the Ministry of Agriculture and Forestry to import them for experimental or research purposes, and the conditions specified in the permit have been fulfilled.

1. Fresh fruits including vegetable fruit (excluding pineapple), on account of Mediterranean fruit fly (*Ceratitis capitata*). Prohibited districts: Indochina, Thailand, Malay, Singapore, Burma, India, Pakistan, Palestine, Syria, Lebanon, Turkey, Cyprus, Greece, Albania, Italy, France, Germany, Switzerland, Malta, Spain, Portugal, Africa, Bermuda, West Indies, Venezuela, Brazil, Uruguay, Argentina, Hawaiian Islands, Australia, New Zealand.

2. Vines, leaves and fresh fruits of cucumber, watermelon, muskmelon, pumpkin, squash and other cucurbitaceous plants; fresh fruits of tomato, mango, papaya, kidney bean, cowpea and pigeon pea, on account of melon fly (*Chaetodacus cucurbitae*). Prohibited districts: Ryukyu Islands, Formosa, Micronesia, China, Hong Kong, Philippine Islands, Indochina, Thailand, Malay, Singapore, British Borneo, Indonesia, Australia, Burma, India, Pakistan, Ceylon, Kenya, Hawaiian Islands, New Guinea.

3. Fresh fruits of apple, pear, quince, peach, plum, apricot and cherry; fresh fruits of walnut and whole walnut in a shell, on account of codling

moth (*Carpocapsa pomonella*). Prohibited districts: U.S.S.R., Burma, India, Pakistan, Iran, Afghanistan, Iraq, Palestine, Cyprus, Europe, Africa, Canada, U.S.A., Brazil, Uruguay, Argentina, Chile, Peru, Australia, New Zealand.

4. Fresh fruits of citrus, loquat, persimmon, plum, peach, mango, papaya, longan, litchy, colomandel gooseberry, guavas, avocado pears, rambutan, *Erenga engleri*, *Solanum verbascifolium*, betelnut, *Eugenia* plants (rose apple, Malayapple), *Artocarpus* plants (jacktree, bread fruit), *Anoma* plants, *Garicinia* plants, *Capsicum* plants and mature banana, on account of mango fly (*Chaetodacus ferrugineas*). Prohibited districts: Bonin Islands, Iwo Islands, Ryukyu Islands, Formosa, Micronesia, China, Hong Kong, Philippine Islands, Indochina, Thailand, Malay, Singapore, British Borneo, Indonesia, Burma, India, Pakistan, Ceylon, Hawaiian Islands, Australia.

5. Vines, leaves, seeds and live tuberous roots of *Ipomoea* plants (sweet potato), on account of sweet potato weevil (*Cylas formicarius*), stem borer (*Omphisa anastomosalis*), small sweet potato weevil (*Euscepes batatae*), witches' broom (virus), internal cork (virus). Prohibited districts: Bonin Islands, Iwo Islands, Ryukyu Islands, Formosa, Micronesia, China, Hong Kong, Philippine Islands, Indochina, Thailand, Malay, Singapore, British Borneo, Indonesia, Burma, India, Pakistan, Ceylon, Africa, U.S.A., West Indies, Guiana, Brazil, Hawaiian Islands, Polynesia, Melanesia, Australia, New Zealand.

6. Vines, leaves, live fruits and live tubers of potato, eggplant, tomato, red pepper and other solanaceous plants, on account of the potato canker (*Synchytrium endobioticum*), powdery scab (*Spongospora subterranea*), potato tuber moth (*Gnorimoschema operculella*) and Colorado beetle (*Leptinotarsa decemlineata*). Prohibited districts: Indonesia, Burma, India, Pakistan, Cyprus, Europe, Africa, North America, South America, Hawaiian Islands, Guam, Australia, New Zealand.

7. Straw of wheat and barley (including straw wrapper, straw matting and other straw goods), and stalks and leaves of *Agropyron* plants, on account of the Hessian fly (*Phytophaga destructor*). Prohibited districts: U.S.S.R., Iran, Asia Minor, Europe, North America, New Zealand.

8. Fresh fruits of apple and other Malus and Crataegus plants, on account of the Manchurian apple moth (*Grapholitha inopinata*). Prohibited districts: China.

9. Rice plant, rice straw and its processed goods, paddy rice and chaff, on account of *Ditylenchus angustus*, *Trichocconis caudata*, *Ephelis oryzae* and other diseases and injurious insects which are not found in Japan. Prohibited districts: Foreign countries excepting Korea, Ryukyu Islands and Formosa.

Netherlands

Order No. JZ/L. 101/84 of 4 February 1958, published in the *Nederlandse Staatscourant*, No. 26, 6 February 1958, governs the importation of strawberry plants in order to prevent the introduction of the red core disease (*Phytophthora fragariae*). Strawberry plants may not be imported unless the following requirements have been fulfilled:

1. The plants are free from red core disease.
2. The plants were grown in a country where red core disease does not occur; if originating from an infested country the plants must be grown on land where the disease had never been reported and the plants must be derived from mother plants which were officially inspected during the preceding growing season for red core.
3. The shipment is accompanied by a phytosanitary certificate issued by the plant protection service of the country of origin, stating that to the best knowledge of the inspecting officer the plants are free from harmful pest and diseases and that the regulations governing the importation of plants into the Netherlands are known to him.
4. In case the plants are imported from a country which is not the country of origin, the shipment must be accompanied by a phytosanitary certificate of the country of origin or a certified copy and a statement by the plant protection service of the exporting country to the effect that the regulations governing importation of plants into the Netherlands are known.

Panama

Decree No. 204 of 12 September 1956 concerning plant protection measures, published in the *Gaceta Oficial*, No. 13286, 3 July 1957, is primarily aimed at preventing the introduction of the Mediterranean fruit fly. All living plant materials may not be imported by any means of transportation, unless they are accompanied by phytosanitary certificates issued by a competent authority of the country of origin and unless they come through authorized ports of entry. They are subject to inspection and disposal by the Ministry of Agriculture upon arrival.

By this new decree it is prohibited to import oranges, mandarins, grapefruits, lemons, mangoes, mameys, guavas, peaches, coffee beans and tomatoes from South America, Bermuda, Azores Islands, Canary Islands, the Mediterranean area, Asia

Minor, Madagascar, Mauritius, Zanzibar, Australia, Hawaii, U.S.A. (Florida), countries on the Mediterranean coast and also all the fruits from Costa Rica.

Peru

Supreme Resolution No. 246 of 7 November 1957, published in *El Peruano*, No. 4997, 14 November 1957, declares the importation of fruit and vegetables, whether fresh or not, to be subject to the restrictions specified in the supreme Decree of 8 September 1911 governing the introduction of seed, cuttings, plants and shrubs. In accordance with the 1911 Decree, the importation of fruit and vegetables must be authorized by the Ministry of Agriculture, and each consignment must be accompanied by a phytosanitary certificate issued by the competent authority of the country of origin and by a statement of the Peruvian consular agent to the effect that the plantations in the exporting country are free from pests and diseases.

Territory of Papua and New Guinea

1. A notice of 22 November 1957 entitled "Declaration of Ports and Landing-places where Imported Plants may be Landed," published in the *Papua and New Guinea Gazette*, No. 60, 28 November 1957, authorizes the following ports and landing places for the landing of imported plants.

Ports	Landing places
Port Moresby	Jackson's Strip, Port Moresby
Lae	Lae Aerodrome, Lae
Madang	Simpson's Harbour
Lorengau	Momote, Manus
Rabaul	Lakunai, Rabaul
Sohano	Boram, Wewak
Samarai	Port Moresby Harbour and Sohano Harbour

This new notice revokes Quarantine Proclamation No. 49 of 6 February 1939.

2. A notice of 13 December 1957 entitled "Prohibition of Import," prohibits the importation of rice straw or chaff. The importation of grass seeds of all species is also prohibited, except where the seed is accompanied by a certificate by a recognized governmental authority, stating that the seed is free from diseases, pests, impurities and weed seeds, and that the area where the seed was harvested is free from cattle tick (*Boophilus australis*) or the seed was fumigated under government supervision with methyl bromide and carbon disulphide in accordance with the Quarantine (Plants) Regulations (see *FAO Plant Prot. Bull.* *5*: 113-114. 1957).

United Kingdom (England and Wales)

The Importation of New Potatoes and Raw Vegetables Order, 1958, which came into operation on 1 March 1958, modifies, for specified periods of 1958, the restrictions imposed by the Importation of Plants Order, 1955, in respect of new potatoes and certain raw vegetables from specified areas and countries in Europe.

New potatoes. New potatoes grown in the countries specified below may be imported in 1958 during the indicated periods:

France	1 March-15 June
Portugal, Spain	1 March-20 May
Italy (Latium region)	1 March-20 May

Consignments of such new potatoes must be accompanied by a prescribed certificate and the following requirements fulfilled:

a) the potatoes have been grown at a distance of at least 2 kilometers from any place where wart disease (*Synchytrium endobioticum*) or ring rot (*Corynebacterium sepedonicum*) has occurred at any time;

b) they have been grown in a district where an intensive system of control of Colorado beetle (*Leptinotarsa decemlineata*) is in operation;

c) they have been riddled and thoroughly washed in a packing station inspected and approved by the phytopathological service of the country of origin and are free from soil and Colorado beetle infestation; and

d) then are packed in new containers bearing a label indicating the name of the packing station.

Vegetables. Raw vegetables mentioned below, grown in the countries and districts specified, may be imported in 1958 during the indicated periods:

Carrots, with foliage not exceeding 5 inches, grown in Belgium, France, Italy and the Netherlands: 1 April-15 October

Cauliflowers (trimmed) grown in Belgium (Brussels, Louvain and Malines districts), France (Districts of Barfleur, Caen, Creances, Lannion, Nantes, Perros-Guirec, Rennes and Saint Pol de Léon), and the Netherlands: 1 April-15 May

Globe artichoke grown in France: 1 April-15 October

Lettuce grown in France (certain specified communes only): 1-15 March

All other raw vegetables (including lettuce but excluding a number of vegetables for which no certificate is required at any time of the year) grown in Belgium (Brussels, Louvain and Malines districts) and the Netherlands: 1-30 April

Consignments of such raw vegetables must be accompanied by a prescribed certificate and the following requirements must be fulfilled:

a) they have been examined and are believed to be free from Colorado beetle infestation; and

b) they have been grown in a district where an intensive system of control of Colorado beetle is in operation.

News and Notes

International Commission for Biological Control

The International Commission for Biological Control (CILB), which was established in 1950 by the International Union of Biological Sciences for the promotion of research and application of biological control primarily in Europe, the Mediterranean basin, the Near East and Africa, held its first general assembly in Paris, 26-28 February 1958. The Commission is now represented by governmental services and research institutions from the following states: France, Algeria, French Overseas territories, Belgium, Belgian Congo, Spain, Morocco, Portugal, Portuguese Overseas territories, Switzerland, Germany, Italy, the Netherlands, Yugoslavia and Iran.

The Commission is governed by an executive committee which meets once every year. During the assembly meeting a new executive committee, with Prof. A. S. Balachowsky of the Pasteur Institute as Chairman, was elected. The activities of the Commission were reported, including the publication of the periodical *Entomophaga*, the compilation of lists on literature concerning biological control of insects and weeds, and the identification of 151 collections of hymenopterous parasites during 1956/57.

Seven working parties have been established to consider the question of control, by biological means, of the following more important insect pests:

1. San José scale
2. Fall webworm
3. Olive fly and Mediterranean fruit fly
4. *Earias insulana*
5. Sugar cane borers
6. Colorado potato beetle
7. Forest defoliators

International Congress of Microbiology

The International Congress of Microbiology will take place in Stockholm, Sweden, 4-9 August 1958, under the auspices of the International Association of Microbiological Societies (IAMS). Among the six subject-matter sections, those on microbial physiology and genetics, microbial chemistry, immunology and virology will be of interest to plant scientists. In addition to the general presentation of technical papers, a symposium with specially invited papers will be organized in each section to deal with a specific problem. Enquiries concerning the Congress should be made to: The Secretary-General, Dr. C. G. Hedén, Bacteriological Department, Karolinska Institutet, Stockholm 60, Sweden.

Golden Jubilee Anniversary of American Phytopathological Society

The American Phytopathological Society is celebrating its 50th anniversary this year. At the annual meeting of the Society to be held at Bloomington, Indiana, 24-28 August 1958, a series of symposia will be presented by more than 70 plant pathologists from both North America and other continents. The symposia will begin with the history and development of plant pathology and cover the significant achievements as well as recent advances in the fields of fungicides, plant virology, nematology, soil microbiology, physiology of parasitism, disease epidemiology, disease resistance and biology of root disease fungi.

The symposium papers will be published in a book entitled *Plant pathology – problems and progress 1908-1958* in the winter of 1958. This book would be of great value to scientists in many fields of interest, as the papers are primarily of basic importance and related to many phases of biological and physical sciences. Orders for the book and inquiries about the anniversary meeting of the Society should be addressed to: The American Phytopathological Society, P. O. Box 1106, New Haven 4, Connecticut, U.S.A.

International Cacao Meetings

The two cacao meetings which will take place in 1958 are the seventh meeting of the Inter-American Technical Committee on Cacao to be held at Palmira, Colombia, 13-20 July, and the FAO International Cacao Meeting to be held in Accra, Ghana, 10-15 November.

The meeting of the Inter-American Technical Committee on Cacao, organized by the Government of Colombia in co-operation with the Inter-American Cacao Center, Inter-American Institute of Agricultural Sciences (IIAS), will deal with all aspects of cacao research, extension and cultivation. The agenda will be shortly distributed and enquiries should be made to: The Secretary-General of the Inter-American Cacao Center, IIAS, Turrialba, Costa Rica.

The International Cacao Meeting convened by FAO will be primarily concerned with cacao production problems, including a world survey of the situation of cacao diseases and pests. Projects requiring international co-operation, such as the exploration of wild species of *Theobroma* in north-

western South America and the desirability of establishing an international center for *Phytophthora* research and resistance tests, will also be considered.

International Meeting on Seed Pathology

The Plant Diseases Committee of the International Seed Testing Association (ISTA) is convening a meeting at the Official Seed Testing Station, Cambridge, England, 12-17 May 1958. Under the auspices of the Committee, a series of comparative tests on seed-borne diseases, using techniques recommended by ISTA, has been carried out at a number of seed testing laboratories in ISTA, member countries. The forthcoming meeting is primarily concerned with discussion of results and problems arising from such tests, consideration of standardized methods for the determination of some of the seed-borne diseases, and planning future tests. The meeting will be open to all specialists on seed-borne diseases. Detailed information may be obtained from: the Chairman of the Committee, Dr. Paul Neergaard, Statens Plantetilsyn, Gersonsvej 13, Hellerup, Denmark.

Roma - Tip. del Senato del dott. Giovanni Bardi

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